Intussusception in dogs and cats: A review of thirty-six cases

Lyndell Levitt, Michael S. Bauer

Abstract

Intussusception is recognized as a common cause of bowel obstruction in small animals. This study documents the clinical and surgical findings in nine cats and 27 dogs diagnosed as having intussusception. The main purposes of the study were to define the predisposing causes and clinical signs of intussusception and to evaluate various surgical techniques commonly employed in its treatment. No common predisposing cause could be established. Diagnosis of intussusception was based most often on clinical signs of bowel obstruction in association with the palpable abdominal mass. The majority of the intussusceptions involved the enterocolic junction. Formation of adhesions was more frequent in cats. Surgical treatments included simple reduction, manual reduction with plication, intestinal resection/anastomosis, and intestinal resection/anastamosis with plication. There was no statistically significant difference ($p > 0.05$) in the recurrence rate of the intussusceptions when the various surgical techniques were compared. Recurrence of an intussusception was not related to either the bowel segment involved or whether a simple reduction, bowel resection, or intestinal plication was performed at the initial surgery.

Résumé

Intussusception chez le chien et le chat : revue de 36 cas

L'intussusception est une cause commune d'obstruction intestinale chez les animaux de compagnie.

Les objectifs principaux de l'étude étaient d'identifier les signes cliniques d'intussusception, de déterminer les facteurs prédisposants et d'évaluer les différentes techniques chirurgicales utilisées pour corriger cette condition. Ce compte rendu rapporte les aspects cliniques et chirurgicaux observés chez 9 chats et 27 chiens.

Les résultats indiquent qu'il n'y avait pas de facteur de risque commun. Un diagnostic d'intussusception a été posé le plus souvent en se basant sur des signes cliniques d'obstruction intestinale et à la palpation d'une masse abdominale. La majorité des intussusceptions se situaient dans la région entérocolique. La présence d'adhérences était plus fréquente chez le chat. Les traitements chirurgicaux utilisés comprenaient : une réduction simple, une réduction combinée à une entéroplication, une résection/anastomose intestinale et une résection/anastomose suivie d'une entéroplication. Les données indiquent qu'il n'y a pas de corrélation ($p < 0,05$) entre le taux de récidive et le segment d'intestin impliqué ou si une réduction simple, une résection intestinale ou une entéroplication avaient été effectuées lors de la chirurgie initiale.

(Traduit par Dr Thérèse Lanthier)

Can Vet J 1992; 33: 660-664

Introduction

Intussusception is defined as a prolapse or invagination of one portion of the gastrointestinal tract into the lumen of an adjoining segment (1,2). The components of an intussusception include the invaginated section, called the intussusceptum, and the enveloping segments, called the intussuscepiens (1,2). The most common clinical signs are associated with partial or complete bowel obstruction. If left untreated, interference with venous drainage and arterial occlusion can lead to ischemia and necrosis of the bowel. Limited objective data have been published detailing the influence of such factors as duration of clinical signs, location of the intussusception, and presence of adhesions on the severity of clinical signs and outcome. Various enteropexy techniques have been advocated to prevent subsequent recurrence of intussusception, yet no objective data have been examined to determine the efficacy of these procedures.

In this article we report the clinical and surgical findings from 27 dogs and nine cats afflicted with intussusception. The purposes of this retrospective study were to determine whether a common predisposing cause existed, to define the most consistent clinical signs associated with intussusception, to determine if the duration of clinical signs or bowel segment involved was related to the presence or absence of adhesions, and to determine if recurrence of an intussusception was related to the bowel segments involved, presence of adhesions, or surgical technique performed.

Materials and methods

Thirty dogs and nine cats with confirmed diagnoses of intussusception were initially included in this study but three canine cases were later excluded because of

Department of Veterinary Anesthesiology, Radiology and Surgery, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan S7N 0W0. Present address of Dr. L. Levitt: Amherst Veterinary Hospital, 4202 Dunbar Street, Vancouver, British Columbia V6F 2E9. Present address of Dr. M.S. Bauer: Department of Clinical Sciences, Veterinary Teaching Hospital, Colorado State University, Fort Collins, Colorado, USA 80523.

Reprints will not be available.

missing data. The cases occurred between 1981 and 1987 at the Western College of Veterinary Medicine. Diagnostic methods included evaluation of clinical history, physical examination, plain abdominal radiography, and contrast radiography. Clinical progression was evaluated from the time of admission to the time of discharge from the hospital. Additional follow-up information was obtained either by re-examination or telephone consultation. Timing of follow-up ranged from six months to six years.

Duration of clinical signs and possible inciting cause were obtained from the case histories. The location of the intussusception, presence or absence of adhesions or necrosis, and surgical procedures performed were obtained from the surgical reports. Surgical treatment consisted of either simple reduction, simple reduction with plication, intestinal resection/anastomosis, or intestinal resection/anastomosis with plication.

Variables analyzed included the associations between the duration of clinical signs and presence of adhesions, the location of the lesion and the presence of adhesions, the location of the lesion and the recurrence rate, and the surgical technique utilized and the recurrence rate. The simple associations between the categorial variables were analyzed using the Fisher's exact test with a cut-off for statistical significance at $p < 0.05$. These statistical analyses were performed only on the canine cases because missing data precluded acceptable statistical analysis of the feline cases.

Results

The ages of the cats diagnosed as having an intussusception ranged from three months to 12 years (average 32.9 months). Of the nine cats, three were female and six were male; no breed predilection was noted. The ages of the dogs ranged from eight weeks to seven years (average 11.9 months). No breed or sex predilection was noted.

The presenting complaints and physical findings are summarized in Table 1. Fecal examination revealed intestinal parasitism in one cat and seven out of 13 dogs tested. Three cases of parvovirus enteritis were coincident with the existence of an intussusception. Five dogs had undergone a surgical procedure within one to four days prior to the diagnosis of an intussusception, and one dog had undergone an exploratory laparotomy three weeks prior to diagnosis. These surgical procedures included an ovariohysterectomy, exploratory laparotomy, patent ductus arteriosus repair, open heart procedure for a subaortic stenosis, repair of a congenital diaphragmatic hernia, and tube gastrostomy for a gastric dilatation-volvulus. Duration of clinical signs prior to diagnosis ranged from one to seven days (median, four days) in cats, and 1–56 days (median, nine days) in dogs (Table 2).

Abdominal radiographs did not consistently lead to a specific diagnosis of intussusception. Plain abdominal radiographs were suggestive of an intestinal mass or foreign body in four cats, and accurately revealed an intussusception in two cats. An abnormal intestinal gas and fluid pattern suggestive of a mechanical obstruction was observed on plain abdominal radiographs in 12 dogs.In seven dogs, no abnormal findings were evident on plain abdominal radiographs; no radiography was performed in eight dogs. Contrast radiography was performed in six dogs and one cat, and confirmed the diagnosis of an intussusception in each of these patients.

Table 1. Presenting complaints and physical findings in cats and dogs with intussusception

Clinical signs	Cats (n = 9)	Dogs (n = 27)
Vomition	8	23
Depression	8	19
Anorexia	7	19
Diarrhea	3	20
Palpable intestinal mass	3	16
Abdominal pain	3	3
Dehydration		
Mild (5–6%)	2	7
Moderate (7–8%)	3	3
Severe (9–10%)	1	3

The signalments, duration of clinical signs, surgical findings, treatment, and outcome are presented in Tables 2 and 3. The most common site of intussusception was the ileocolic junction (five cats, 16 dogs). Three cats and 11 dogs had enteroenteric intussusception with involvement restricted to the jejunum or ileum. The location of the intussusception was not recorded in the medical record of one of the cats. Serosal adhesions between the intussusceptum and intussuscepiens were evident in seven cats (87.5%) and 12 dogs (50%). Nine of 16 dogs with ileocolic intussusception and three of 11 dogs with jejunal intussusception, had adhesions. Adhesions were noted on the second surgery in three of five dogs with recurrent intussusception; only two of these dogs had serosal adhesions on their initial surgery. No statistically significant correlation could be established between duration of signs or location of intussusception and the presence of adhesions. Peritonitis was evident in one cat; none of the other animals exhibited any degree of peritonitis on initial surgery despite various degrees of intestinal necrosis.

Simple reduction was performed in two cats and 10 dogs, whereas intestinal resection and anastomosis were deemed necessary in five cats and 14 dogs. Intestinal plication was performed in two cats and six dogs. No surgery was performed in two cats and two dogs, and the animals were euthanized at the request of their owners.

In five dogs, an intussusception recurred within 24–120 hours after the initial surgery. Of the dogs with recurrence, two initially had simple reductions, two had an intestinal resection/anastomosis, and one had a simple reduction with jejunal plication. Three of the dogs with recurrence had initial involvement of the jejunum and two had initial involvement of the ileocolic region. In the dog with jejunal plication, the recurrent intussusception occurred just proximal to the site of the plication. None of the other five dogs with intestinal plications had any recurrence. The rate of

Table 2. Signalment, duration of clinical signs, location of lesion, surgical technique, and outcome in nine cats with intussusception

Case	Age	Sex	Breed	Duration of clinical signs	Location of lesion	Surgical technique	Outcome
1	NR[a]	M	DSH	1 week	ileocolic[b]	none	euthanized
2	1 yr	F	Siamese	2 days	ileocolic	resection/anastomosis	recovered
3	1 yr	M	DSH	3 days	jejunum	resection/anastomosis with plication	recovered
4	4 yr	M	DSH	NR[a]	jejunoilial	resection/anastomosis with plication	recovered
5	12 yr	M/C	Siamese	1 week	ileocolic	resection/anastomosis	euthanized[c]
6	3 mo	M	Siamese	1 day	ileocolic	manual reduction alone	recovered
7	3 yr	F	DSH	NR[a]	ileocolic[b]	none	euthanized
8	10 wk	M	DSH	1 day	jejunum	resection/anastomosis	recovered
9	1 yr	F	Siamese	1 week	NR[a]	manual reduction alone	recovered

[a]Not recorded
[b]Euthanized at request of owner. Intussusception confirmed at necropsy
[c]Intestinal adenocarcinoma diagnosed on biopsy; euthanized postsurgery

Table 3. Signalment, duration of clinical signs, location of lesion, surgical technique, and outcome in 27 dogs with intussusception

Case	Age	Sex	Breed	Duration of clinical signs	Location of lesion	Surgical technique	Outcome
10	15 mo	F	Cocker spaniel	2 days	ileocolic	resection/anastomosis	recovered
11	7 yr	F/S	Irish setter	2 days	jejunum	resection/anastomosis with plication	died/surgical complication
12[b]	8 wk	M	German shepherd	1 week	ileocolic	manual reduction with plication	recovered
13	10 wk	M	Doberman	1 week	ileocolic	resection/anastomosis	recovered
14	1 yr	M	German shepherd	3 wk	ileocolic	manual reduction alone	recovered
15	9 mo	M	Shepherd mix	2 wk	ileocolic	resection/anastomosis	recovered
16	8 mo	M	German shepherd	3 wk	ileocolic	resection/anastomosis with plication	recovered
17	8 mo	M	Golden retriever	2 days	ileocolic	manual reduction alone	recovered
18	8 mo	M	German shepherd	8 wk	ileocolic	resection/anastomosis	recovered
19	5 mo	M	Shepherd mix	3 days	ileocolic	none[c]	recovered
20	3 mo	M	Doberman	3 days	jejunal	manual reduction with plication	died/CPV
21[b]	7 mo	F	German shepherd	6 days	ileocolic	resection/anastomosis	died/surgical complication
22	2 yr	F	Husky	10 days	ileocolic	resection/anastomosis	recovered
23[b]	1 yr	F	Australian heeler	3 days	jejunum	manual reduction alone	recovered
24	12 wk	M	Bassett hound	10 days	ileocolic	resection/anastomosis	recovered
25	3 mo	F	German shepherd	3 wk	ileocolic[a]	none	euthanized
26	1 yr	F/S	Shepherd mix	1 day	jejunum	manual reduction alone	recovered
27	5 wk	F	Sheltie	1 day	jejunum	manual reduction with plication	recovered
28	4 yr	M	Labrador retriever	1 day	jejunum	manual reduction alone	recovered
29	5 mo	F	Irish wolfhound	2 wk	jejunum[a]	none	euthanized
30	2 yr	F	Husky	5 days	ileocolic	resection/anastomosis	died/CDV
31	14 wk	M	Doberman	4 wk	ileocolic	resection/anastomosis	recovered
32[b]	10 wk	F	Irish setter	1 week	jejunum	resection/anastomosis	euthanized
33[b]	9 wk	M	Spaniel mix	2 days	jejunum	manual reduction alone	recovered
34	12 wk	F	Mix	5 days	jejunum	resection/anastomosis	recovered
35	6 mo	F	Shepherd mix	2 days	ileocolic	manual reduction with plication	recovered
36	12 wk	M	Samoyed	3 days	jejunal	resection/anastomosis	died/surgical complication

CPV = canine parvovirus
CDV = canine distemper virus
[a]Euthanized at request of owner. Intussusception confirmed at necropsy
[b]Recurrence of intussusception within 24–120 hours after initial surgery
[c]Ileocolic intussusception diagnosed radiographically and successfully reduced with barium enema

recurrence in the dogs in this study was 22% for intussusceptions manually reduced without plication (n = 6), 14% for those surgically treated by resection/anastomosis without plication (n = 12), and 16% for the plicated cases (n = 6). The simple associations between the recurrence rate of the intussusception versus the surgical techniques and recurrence rate versus bowel segment involved were investigated using the Fisher's exact test; the cut-off for statistical significance was $p < 0.05$ (95% confidence levels). There was no statistically significant difference in the recurrence rate of the intussusception when comparing the varied surgical techniques or bowel segment involved.

Surgical repair of the recurrent intussusception consisted of simple reduction in one dog, resection/anastomosis with plication in two dogs, and simple reduction with plication in one dog. One dog was euthanized at the owner's request when the intussusception recurred. Two dogs recovered completely, one dog developed peritonitis and died two days after the second surgery, and one dog recovered from the second surgery but developed canine distemper and was euthanized one month later.

Discussion

Two retrospective studies have been published describing gastrointestinal intussusception in small animals. Wilson and Burt reviewed 50 cases of intussusception in 45 animals (40 canine, 5 feline) (3) and Weaver reviewed 26 canine intussusceptions (4). Most authors have indicated that puppies and kittens have a much higher incidence of intussusception than adult animals (2,5,6). Thirty-seven of the 45 animals in Wilson and Burt's study were less than one year of age (3) and 19 of 26 dogs in Weaver's study were less than six months old (4). In our study, 20 of 27 dogs were less than one year of age whereas only two of nine cats were less than one year old. No breed or sex predilection was evident in either species.

Intussusceptions have been reported as sequelae to a number of conditions, including intestinal parasitism (3,7), linear foreign bodies (3,8,9), viral-induced enteritis (3,7,8,10–12), intestinal masses (3,13), and prior abdominal surgery (14–16). Although abdominal surgery has previously been listed as a possible inciting cause of intussusception, it is interesting to note that two of the five cases which had undergone a surgical procedure within one to four days of developing an intussusception involved thoracic surgery. Although the reported incidence of intussusception occurring after a surgical procedure remains low, careful monitoring of all postoperative cases for signs of intussusception is recommended. In our series of clinical cases, various histories preceded the development of intussusception. Although several of the aforementioned conditions were present in our patients, no common predisposing cause could be established from our study. The majority of cases had a history of vomiting; however, it was impossible to discern whether or not this was a cause or a result of the intussusception. The majority of intussusceptions seen in small animals are idiopathic (3,7,8,10–12).

The presenting signs in dogs and cats with intussusception are varied and nonspecific, and may be seen in a number of acute abdominal conditions. Some authors have defined the cardinal signs of intussusception as vomition, bloody mucoid diarrhea, and a palpable cylindrical abdominal mass (2,11). The most common clinical signs in both species in the present study included vomition, depression, and anorexia. Diarrhea was more commonly seen in dogs than cats, and abdominal pain was not a consistent finding in either species.

In our study, the diagnosis of intussusception was most often dependent on the ability of the clinician to palpate an abdominal mass. A palpable abdominal mass was evident in 53% of the cases presented in this report (three cats, 17 dogs). Definitive radiographic diagnosis of an intussusception on plain films was difficult. Contrast radiography was effective in confirming a presumptive diagnosis of intussusception. Barium enemas are used to reduce enterocolic intussusception in human infants (17–19); although the efficacy of barium enemas has not been reported in the veterinary literature, one of the cases in this study (case #19) was successfully reduced with this method. This procedure may prove useful in isolated cases, but its efficacy needs to be further studied before any recommendations can be made regarding its usefulness in small animals.

Intussusceptions are classified according to their location in the alimentary tract (2). Gastroesophageal, pylorogastric, enteroenteric, enterocolic, and colocolic intussusceptions have all been reported in small animals. Previous reports have indicated that the majority of intussusceptions in small animals are enterocolic (2,3,8,11,20,21). Fifty-one percent of the intussuceptions reported herein occurred at the enterocolic junction.

Although the duration of clinical signs prior to diagnosis was shorter in cats than in dogs, serosal adhesions were found more frequently in cats (7/8) than in dogs (12/26). This finding may reflect a species difference in the degree of serosal damage following vascular compromise to the bowel in association with intussusception. No relationship was evident between the duration of clinical signs and the presence or absence of adhesions. Of the 12 dogs with adhesions, those with intussusception at the enterocolic level appeared to be more at risk of developing adhesions than those with intussusception involving the small intestine alone (enteroenteric intussusception); this trend was not evident in the feline cases where adhesions were common irrespective of the bowel segment involved.

The surgical management of intestinal intussusception involves either manual reduction, or resection and anastomosis, or both (1,12). The decision to resect is based on the surgeon's gross evaluation of the viability of the intestinal components of the intussusception. Recurrence of intussusception is common (1–4,7, 10–12,20–23), and various enteroplication or enteropexy techniques have been described to prevent recurrence (1,2,22–24). Surgical resection and anastomosis of the intussusception are reported to lessen the incidence of recurrence when compared with manual reduction (8,22). All of the cats undergoing corrective surgery

for an intussusception in this set of cases survived without any recurrence or postoperative complications; however, recurrence of the intussusception occurred in five of the 27 dogs (18.5%) reported here. Our data indicate that the recurrence of intussusception is not related to either the bowel segment involved *or* whether a simple reduction, bowel resection, or intestinal plication is performed at the initial surgery. The efficacy of plication as a prophylactic measure could not be adequately demonstrated in this study due to the small number of cases in which plication was performed. Further evaluation and controlled studies are warranted to assess the effectiveness of plication in preventing recurrence of intussusception.

With recurrence, the intussusception is usually proximal to the anastomotic site or the plicated section of the bowel (2,12). In our study, a recurrent intussusception occurred just proximal to the site of plication in case 12. If plication is used, we recommend that the enteroplication include the entire small intestine from the distal duodenum to the distal ileum (25), rather than just a few loops proximal to and distal to the intussusception site. This technique prevents the formation of acute "kinks" or folds in the bowel wall which may predispose to the formation of an intussusception (26,27).

The prognosis associated with intussusception depends on such factors as the anatomic location, duration, degree of mechanical obstruction, and the predisposing cause. Underlying systemic disease, such as canine distemper or parvoviral enteritis, will increase morbidity and mortality (2); three of six postoperative deaths in our study were related to either parvoviral or canine distemper viral infections. Other published reports have reported recovery rates ranging from 35%–65% (3,4). Of the 31 cases undergoing surgical correction in our report, 23 (74%) survived and were fully recovered at follow-up periods ranging from a minimum of six months to seven years. Early recognition of an intussusception, aggressive fluid therapy, and prompt surgical correction should result in better survival rates in future.

Acknowledgments

We thank Dr. Joyce Van Donkersgoed, Western College of Veterinary Medicine, Saskatoon, for assistance with the statistical analyses. CVJ

References

1. Rosin E. Small intestinal surgical disorders. In: Slatter DJ, ed. Textbook of Small Animal Surgery. Vol 1. Toronto: W.B. Saunders, 1985: 748–749.
2. Lewis DD, Ellison GW. Intussusception in dogs and cats. Compend Contin Educ Pract Vet 1987; 9: 523–534.
3. Wilson GP, Burt JK. Intussusception in the dog and cat: A review of 45 cases. J Am Vet Med Assoc 1974; 164: 515–518.
4. Weaver AD. Canine intestinal intussusception. Vet Rec 1977; 100: 524–527.
5. Bellenger CR, Middleton DJ, Ilkiw JE, Watson ADJ. Double intussusception followed by reintussusception in a kitten. Vet Rec 1982; 110: 323–324.
6. Keller SD. Chronic intestinal intussusception in a dog. Aust Vet Pract 1983; 13: 70–72.
7. Tangner CH. A review of canine intestinal intussusception. Southwest Vet 1982; 34: 203–207.
8. Larsen LH, Bellenger CR. Stomach and small intestine. In: Archibald J, ed. Canine Surgery. 2nd ed. Santa Barbara, California: American Veterinary Publications, 1974: 583–585.
9. Reed JH, Catcott EJ. Intestinal diseases. In: Catcott EJ, ed. Feline Medicine and Surgery. 2nd ed. Santa Barbara, California: American Veterinary Publications, 1975: 163–164.
10. O'Brien TR. Radiographic Diagnosis of Abdominal Disorders in the Dog and Cat: Radiographic Interpretation, Clinical Signs, Pathophysiology. Davis, California: Covell Park Vet Co., 1978: 311–320.
11. Butler HC. Surgery of the small intestine. Vet Clin North Am [Small Anim Pract] 1972; 2: 160–161.
12. Ellison GW. Nontraumatic surgical emergencies of the abdomen. In: Bright R, ed. Contemporary Issues in Small Animal Practice. Vol. 2. New York: Churchill Livingstone, 1986: 127–173.
13. Runyon CL, Merkley DF, Hagemose WA. Intussusception associated with a paracolonic enterocyst in a dog. J Am Vet Med Assoc 1984; 185: 443.
14. Kipins RM. A case of postoperative intussusception in a dog. J Am Anim Hosp Assoc 1977; 13: 197–199.
15. Olsen PR, Boserup F, Mikkelsen AM, *et al.* Intussusception following renal transplant in dogs. Nord Vet Med 1977; 29: 36–40.
16. Dutoit DF, Homan WP, Reece-Smith H, *et al.* Canine intestinal intussusception following renal and pancreatic transplantation. Vet Rec 1981; 108: 34–35.
17. Gierup J, Jorulf H, Livaditis A. Management of intussusception in infants and children: A survey based on 288 consecutive cases. Pediatrics 1972; 50: 535–546.
18. Raidlovo PJ, Smith H. Intussusception: Analysis of 98 cases. Br J Surg 1981; 68: 645–648.
19. Franken CA, Smith LW, Chernish SM, *et al.* The use of glucagon in hydrostatic reduction of intussusception: A double blind study of 30 patients. Radiology 1983; 146: 687–689.
20. Krahwinkel DJ, Richardson DC. Intestines. In: Bojrab MJ, ed. Current Techniques in Small Animal Surgery. 2nd ed. Philadelphia: Lea & Febiger, 1983: 162–173.
21. Strombeck DR. Small Animal Gastroenterology. Davis, California: Stonegate Publishing, 1979: 295.
22. Wolfe DA. Recurrent intestinal intussusception in the dog. J Am Vet Med Assoc 1977; 171: 553–556.
23. Engen MH. Bowel plication for preventing recurrent intussusception. In: Bojrab MJ, ed. Current Techniques in Small Animal Surgery. 2nd ed. Philadelphia: Lea & Febiger, 1983: 183.
24. Crowe DT. Enteroplication to prevent recurrent intestinal intussusception. In: Bojrab MJ, ed. Current Techniques in Small Animal Surgery. 3rd ed. Philadelphia: Lea & Febiger, 1990: 255–257.
25. Seim HB. Intussusception. In: Binnington AG, Cockshutt JR, eds. Decision Making in Small Animal Soft Tissue Surgery. St. Louis, Missouri: C.V. Mosby, 1988: 28–29.
26. Reymond RD. A mechanism of the kink formation which precedes intussusception. Invest Radiol 1971; 6: 61–64.
27. Reymond RD. The mechanism of intussusception: A theoretical analysis of the phenomenon. Br J Radiol 1972; 45: 1–7.